The Effects of a "New" Walking Aid on Exercise Performance in Patients With COPD: A Randomized Crossover Trial

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COPD

The Effects of a "New" Walking Aid on Exercise Performance in Patients With COPD

A Randomized Crossover Trial

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Background: **Generally, the use of a rollator improves mobility in patients with COPD. Nevertheless, not all patients benefit from its use, and many patients feel embarrassed about using it. Therefore, other walking aids are worthwhile to consider. We compared the direct effects of a "new" ambulation aid (a modern draisine) with the effects of a rollator on 6-min walk distance (6MWD) in patients with COPD.**

Methods: **Twenty-one patients with COPD performed two 6-min walk tests (6MWTs) during prerehabilitation assessment (best 6MWD: 369 ± 88 m). Additionally, two extra 6MWTs were performed on two consecutive days in random order: one time with a rollator and one time with a modern draisine. Walking pattern (n = 21) was determined using an accelerometer, and metabolic requirements (n = 10) were assessed using a mobile oxycon.**

Results: **Walking with the modern draisine resulted in a higher 6MWD compared with walking with the rollator (466 ± 189 m vs 383 ± 85 m). Moreover, patients had fewer strides (245 ± 61 vs 300 ± 49) and a greater stride length (1.89 ± 0.73 m vs 1.27 ± 0.14 m) using the modern draisine compared with the rollator (all $P \leq .001$). Oxygen uptake, ventilation, heart rate, oxygen saturation, and Borg symptom scores were comparable between both walking aids. Ten percent of the patients felt embarrassed using the modern draisine compared with 19% for the rollator, and a significantly smaller proportion of patients would use the modern draisine in daily life.**

Conclusions: **The mean difference in 6MWD between a modern draisine and a rollator seems clinically relevant, with the same metabolic requirements and symptom Borg scores. Therefore, this "new" ambulation aid could be a good alternative to the rollator to improve functional exercise performance in patients with COPD.**

Trial registry: **The Netherlands National Trial Registry; No.: NTR1542; URL: www.trialregister.nl**

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Abbreviations: 6MWD = 6-min walk distance; 6MWT = 6-min walk test

Patients with COPD regularly experience walking as a problematic activity in everyday life.[1] Indeed, patients walk less and at a lower intensity in daily life compared with their healthy peers.[2] Moreover, patients with COPD have a severely reduced functional exercise capacity as assessed by the 6-min walk test (6MWT),[3-5] which contributes to a higher exacerbation-related hospitalization risk, a reduced quality of life, and a worse prognosis.[6]

Ambulation aids (ie, rollators [Fig 1A]) can contribute to independent living and safe mobility, although strength and metabolic demands can be excessive.[7] The use of a rollator generally results in clinically relevant improvements in 6-min walk distance (6MWD) of 22 to 46 m compared with an unaided 6MWD, particularly in sedentary patients with COPD.[8-11] This is at least in part due to an increase in maximal voluntary ventilation of about 10% while using a rollator compared with not using an ambulation aid.[10] Indeed, by bracing their arms on the rollator, patients with COPD can adopt the "forward-lean" position, which may improve diaphragm function and, therefore,

increase ventilatory capacity.[12] This may also explain why rollator use is effective in relieving exercise-induced dyspnea in patients with COPD and advanced disease.[13,14]

On average, a rollator is beneficial for patients with COPD,[15] yet not all patients benefit from its use.[8,10,16] Moreover, 48% of the patients with COPD using a rollator feel embarrassed about its use in daily life.[17] Therefore, other ambulation aids may be worthwhile to consider in patients with COPD. Unfortunately, the effects of unwheeled Zimmer frames on 6MWD are insignificant in elderly patients with COPD.[16]

In 1817, Karl Drais invented the "Laufmaschine," the earliest form of a bicycle, but without pedals, later also called the velocipede or draisine.[18] The modern version of the draisine (Fig 1B) may also improve 6MWD in COPD. Indeed, by holding the handlebars it increases maximal voluntary ventilation and, in turn, 6MWD, similar to the results achieved with a rollator.[10] Moreover, by sitting on the seat of the modern draisine the load on the deconditioned muscles of ambulation is reduced.[19] In turn, this may result in a significantly lower cost of transport (eg, milliliters per minute of oxygen uptake per meter), allowing patients with COPD to achieve a higher 6MWD with similar effort.

To date, the direct effects of this "new" ambulation aid on 6MWD remain unknown in patients with COPD. Prospectively, we sought to determine whether the modern draisine had similar direct effects on 6MWD as those of a rollator in patients with COPD. Moreover, we aimed to assess walking pattern, exercise-induced symptoms, metabolic requirements using both ambulation aids, and patient satisfaction using both ambulation aids.

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Materials and Methods

Design

The study followed a prospective, randomized, crossover design. Patients were eligible to participate when they had been given a diagnosis of COPD, had a 6MWD ≤ 500 m (see the "Study Protocol" section for details), and had had no acute COPD exacerbation in the previous 4 weeks. Patients suffering from a musculoskeletal, cardiovascular, or neurologic disorder were excluded. All subjects gave written informed consent to participate in the study, which was approved by the medical ethical committee of the Maastricht University Medical Centre (MEC 08-3-069). The current project was registered on www.trialregister.nl (NTR1542) before enrollment of the first volunteering participant.

Study Protocol

Patients were recruited by A. W. V. and M. W. J. C. at CIRO+.[20] During routine prerehabilitation assessment, pulmonary function and body composition were determined as described earlier.[3] A symptom-limited cardiopulmonary exercise test on a cycle ergometer (Ergoline 200P; Ergoline GmbH) was used to determine peak aerobic capacity and was performed according to international guidelines.[21] In addition, functional exercise performance, including a practice walk. was determined using the 6MWT as described by the latest American Thoracic Society guidelines.[22,23] Only patients with a 6MWD ≤ 500 m were eligible to participate in the current study, because these patients are expected to benefit the most from the use of ambulation aids.[15]

Eligible patients were asked to perform two additional 6MWTs in a triangular walking course of 125 m on two consecutive weekdays. Patients were randomly assigned, using sealed envelopes (made by M. A. S.), to do a 6MWT with a rollator on day 1 (Fig 1A), followed by a 6MWT with the modern draisine on day 2 (Fig 1B), or vice versa. See e-Appendix 1 for specifications and settings for both ambulation aids.

All patients were familiarized with both ambulation aids through verbal instructions, in combination with a practice session of 10 min by M. W. J. C. The familiarization procedure was set up in close collaboration with an experienced occupational therapist (J. W.). M. W. J. C. supervised all additional aided 6MWTs, which were also performed in accordance with American Thoracic Society guidelines.[22] At the end of the 6MWTs, patients were asked to complete a questionnaire about their preference for and confidence in and the safety of the ambulation aid (e-Appendix 1).

Outcomes

Primary outcome was the difference in 6MWD (in meters) between the modern draisine and the rollator. In addition, several explanatory outcomes were assessed: the number of assessor-initiated stops (based on an exercise-induced oxygen saturation < 80%), transcutaneous oxygen saturation, heart rate, Borg symptom scores for dyspnea and fatigue[24] before and after each 6MWT and after 2 min of recovery, metabolic requirements during each 6MWT, number of strides, stride length, root mean square of the acceleration in mediolateral direction, walk ratio, and patient's preference for and confidence in the ambulation aid. See e-Appendix 1 for details.

Statistics

Data are presented as mean and SD, unless noted otherwise. The paired-samples *t* test was used to assess differences between the use of the rollator and the modern draisine. A priori, the level of significance was set at ≤ .05. No adjustment was made to the statistical significance level for multiple comparisons. All data were analyzed with SPSS, version 17.0 (SPSS Inc).

FIGURE 1. Walking aids. A, Rollator. B, Modern draisine.

RESULTS

One hundred fifteen of the 158 subjects who were screened between January 2009 and January 2011 were ineligible to participate for various reasons (see Figure 2 for details). In addition, 15 eligible subjects declined participation because of lack of interest, dyspnea, or fatigue. The characteristics of these patients were not significantly different from those enrolled in this study. Of the remaining 28 eligible patients with COPD, seven were excluded (one before the performance of the two aided 6MWTs and six after the performance of the first aided 6MWT) because of the onset of symptoms of an acute COPD exacerbation (n = 4), orthopedic problems (n = 2), or malfunctioning of the measurement system that collected the gait pattern information (n = 1). Finally, 21 patients with COPD completed both aided 6MWTs.

Patient Characteristics

On average, patients had moderate to very severe COPD, a normal BMI, and a normal fat-free mass index (Table 1). The best 6MWD during routine prerehabilitation assessment was 369 ± 88 m. Eight patients (38%) used a rollator during routine prerehabilitation 6MWTs, whereas 11 patients (52%) used long-term oxygen therapy. Therefore, data on metabolic requirements are available in 10 patients with COPD. Patients receiving long-term oxygen therapy transported their oxygen in the basket of the rollator or the modern draisine.

Effects of Ambulation Aids on 6MWD

On average, 6MWT with the modern draisine resulted in a significantly higher 6MWD compared with 6MWT with the rollator (466 ± 189 m vs 383 ± 85 m, $P = .011$) (Table 2), with no significant differences between patients who had already used a rollator before and those who had walked unaided (Fig 3).

Patients with COPD who did not use a rollator at baseline had a baseline 6MWD of 384 ± 90 m. Use of a rollator resulted in a significantly higher 6MWD compared with baseline (402 ± 83 m, $P = .040$). Moreover, using the modern draisine resulted in a mean 6MWD of 501 ± 200 m, which was significantly higher than baseline 6MWD ($P = .024$) and rollator-aided 6MWD ($P = .038$).

Effects of Ambulation Aids on Exercise-Induced Symptoms

No significant differences were found between 6MWT with the rollator or the modern draisine in Borg symptom scores for dyspnea and fatigue at the start of 6MWT, at the end of 6MWT, or after 2 min recovery (Table 2). Moreover, the number and duration of patient-initiated stops were comparable between both ambulation aids (Table 2). The main reason for patient-related stops was dyspnea. Other reasons were fatigue and/or pain in shoulders/arms, foot, os sacrum, or lower back. There were no assessor-initiated stops.

Effects of Ambulation Aids on 6MWD Walking Pattern

The use of the modern draisine resulted in significantly fewer strides compared with the rollator (245 ± 61 vs 300 ± 49, $P = .001$). Consequently, patients had a significantly lower stride frequency and a greater stride length with the modern draisine compared with the rollator ($P = .001$) (Table 2). Moreover, the walk ratio was significantly higher and the root mean square in the mediolateral direction was significantly lower while using the modern draisine compared with the rollator ($P = .001$).

Effects of Ambulation Aids on Metabolic Requirements

Oxygen uptake, ventilation, heart rate, and oxygen saturation before and directly after the 6MWT were

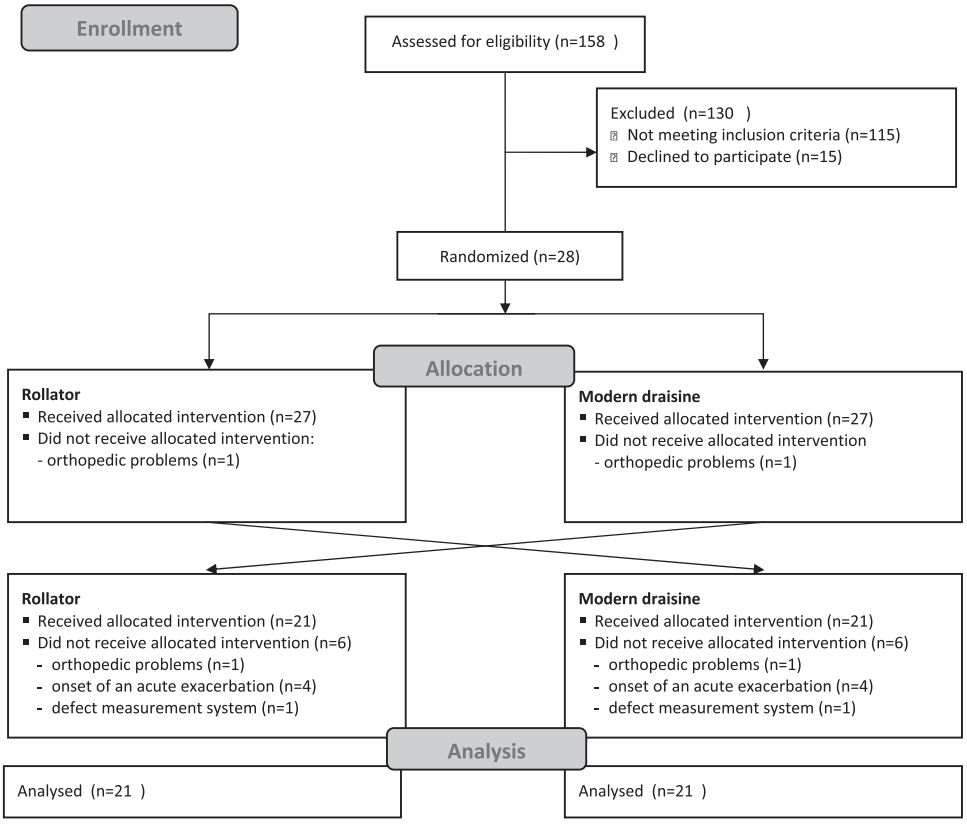

FIGURE 2. Disposition of patients.

comparable between ambulation devices, as well as after 2 min of recovery (Table 3). Because of the longer walking distance, use of the modern draisine resulted in a significantly lower cost of transport (oxygen uptake per meter) compared with use of the rollator (0.10 [0.03] vs 0.14 [0.03] mL/min/m, $P < .05$).

Level of Acceptance With Use of Ambulation Aids

Sixty-two percent of the patients with COPD had never used a rollator before in daily life or during 6MWT, but 81% liked the rollator and 76% would use it in daily life. Nineteen percent of the patients with COPD felt embarrassed using the rollator (Table 4).

None of the patients had ever used the modern draisine. Although only 10% of the subjects felt embarrassed using the modern draisine, significantly fewer patients (38%) would like to use the new ambulation aid in their daily life, compared with a rollator ($P < .05$). Furthermore, significantly more patients believed they walked further than during unaided 6MWT while using rollator compared with the modern draisine ($P < .01$).

Patients with COPD gave significantly higher scores for the stability and solidity of the rollator compared with the modern draisine ($P < .05$). Moreover, the feeling of falling was significantly lower while using the rollator ($P < .05$). No significant differences were found in scores for safety and confidence between the rollator and the modern draisine.

DISCUSSION

The current study has three important findings. First, ambulation aids generally improve functional exercise performance in patients with COPD. Second, the use of the modern draisine may result in clinically relevant improvements in 6MWD in patients with COPD as compared with a rollator-aided 6MWT, whereas the metabolic requirements and exercise-related symptoms are comparable. Third, clear differences in gait pattern were observed between the modern-draisine-aided 6MWT and the rollator-aided 6MWT, resulting in a lower cost of transport for the modern draisine compared with the rollator. This partially explains the difference in 6MWD.

Previous studies have already shown that the use of a rollator during 6MWT is associated with a significant improvement in walking distance of 22 to 46 m.[8-10,25] To the best of our knowledge, this study is the first to compare the effects of a rollator on 6MWD with those of a "new" walking frame in patients with

Table 1—*Baseline Characteristics (N = 21)*

Characteristics	Value
Demographics	
Men, %	52.4
Age, y	64.2 (10.1)
Pulmonary function	
FEV_1, L	1.1 (0.3)
FEV_1, % predicted	42.0 (15.0)
FEV_1/FVC, %	37.3 (10.2)
GOLD stage I/II/III/IV, No.	0/3/9/9
MRC grade 1/2/3/4/5, No.	1/2/6/5/7
Body composition	
BW, kg[a]	66.0 (19.0)
BMI, kg/m^2	23.5 (5.3)
FFM, kg	45.7 (9.9)
FFM, kg/m^2	16.3 (2.2)
6MWD, m	369 (88.0)
Borg dyspnea, points	5.4 (2.2)
Borg fatigue, points	4.4 (2.3)
Cardiopulmonary exercise test	
Peak $\dot{V}O_2$, mL/min	902 (284)
Peak $\dot{V}O_2$, mL/min/kg BW	13.9 (4.4)
Peak $\dot{V}E$, L	37.9 (8.8)
Peak $\dot{V}E$, % MVV	88.7 (17.9)
Peak HR, bpm	122.2 (22.3)
Peak HR, % max HR	79.9 (17.5)
Borg dyspnea, points	7.1 (1.8)
Borg fatigue, points	5.9 (2.4)

Data are presented as mean (SD) unless indicated otherwise. 6MWD = 6-min walk distance; bpm = beats per minute; BW = body weight; FFM = fat-free mass; GOLD = Global Initiative for Chronic Obstructive Lung Disease HR = heart rate; MRC = Medical Research Council; MVV = maximal voluntary ventilation; $\dot{V}E$ = minute ventilation; $\dot{V}O_2$ = oxygen uptake.
[a]1 kg = 2.2046 lb.

COPD. The mean difference in 6MWD between the modern draisine and the rollator clearly exceeded the upper limit of the 95% CI (61 m) of the updated minimal clinically important difference of 6MWD as proposed by Holland et al.[11] Indeed, occupational therapists may want to consider the use of the modern draisine to augment the mean improvement in 6MWD of 50 m following exercise-based pulmonary rehabilitation.[20]

None of the patients with COPD had used the modern draisine before. Therefore, all patients had a practice walk of 10 min with each ambulation aid. This may be too short for proper familiarization. Some patients reported having problems with their balance during the extra 6MWTs. Indeed, six subjects walked 17 to 135 m less with the modern draisine compared with the rollator in the 6MWT (Fig 3). Then again, one patient had pain in the os sacrum due to an accidental fall one day before the draisine-aided 6MWT, which made sitting on the seat of the draisine painful, and another patient bumped her foot on the bike, resulting in pain during the 6MWT. Because the rollator and the modern draisine were adapted to the size of the patients (e-Appendix 1), balance problems were not caused by incorrect adjustment of the ambulation aids. However, a rollator is a stable ambulation aid, whereas the modern draisine needs the active support of the user to remain stable and to avoid falling. Therefore, a 6MWT with the modern draisine could result in a feeling of less safety in terms of balance and falling. This may improve when patients are able to practice more frequently or for a longer period (> 10 min).

Previously, Probst and colleagues[10] investigated the direct effects of the use of a rollator on metabolic requirements in patients with COPD. They found an average oxygen uptake of 1.0 L/min and a ventilation of 34 L/min in patients during a rollator-aided 6MWT. This is very consistent with our results. Indeed, walking with the rollator resulted in a mean oxygen uptake of 0.9 L/min and a mean ventilation of 34.8 L/min compared with a mean oxygen uptake of 0.9 L/min and a mean ventilation of 35.3 L/min when walking with the modern draisine. Differences in overall metabolic requirements between the two ambulation aids were not significant. However, while using the modern draisine, patients with COPD walked, on average, 83 m further with the same oxygen uptake, ventilation, and heart rate compared with walking with a rollator (Tables 2, 3). In patients with COPD, therefore, the use of the modern draisine resulted in a greater walking distance with the same energy use and metabolic demands, which could be considered an improvement in walking economy.

Table 2—*Effects of Ambulation Aids (N = 21)*

Variables	Rollator	Modern Draisine	*P* Value
6MWD, m	382.8 (84.7)	465.9 (188.5)	.011
Strides, No.	300.3 (49.1)	245.3 (60.9)	.001
Stride length, m	1.27 (0.14)	1.89 (0.73)	.001
Stride frequency, strides/s	0.88 (0.11)	0.76 (0.14)	.001
Number of stops	0.50 (0.68)	0.62 (0.86)	.186
Total duration of stops, s	20.5 (29.9)	25.9 (35.0)	.297
Walk ratio, m/(steps/s)	1.46 (0.22)	2.36 (1.04)	.001
Acceleration RMS	0.19 (0.07)	0.10 (0.03)	.001
Borg dyspnea before, points	2.0 (1.5)	1.7 (1.2)	.351
Borg dyspnea after, points	4.9 (1.8)	5.1 (1.3)	.620
Borg dyspnea 2 min after, points	3.0 (1.2)	3.3 (1.5)	.377
Borg fatigue before, points	1.9 (1.8)	1.4 (1.4)	.154
Borg fatigue after, points	3.6 (2.4)	3.9 (2.3)	.543
Borg fatigue 2 min after, points	2.7 (2.0)	2.4 (1.7)	.342
Spo_2 before, %	93.4 (2.0)	93.4 (2.2)	1.000
Spo_2 drop, %	−8.0 (4.0)	−8.1 (5.2)	.950
Spo_2 2 min after, %	94.2 (2.1)	94.1 (1.8)	.729

Data are presented as mean (SD). RMS = root mean square; Spo_2 = saturation of peripheral oxygen. See Table 1 legend for expansion of other abbreviations.

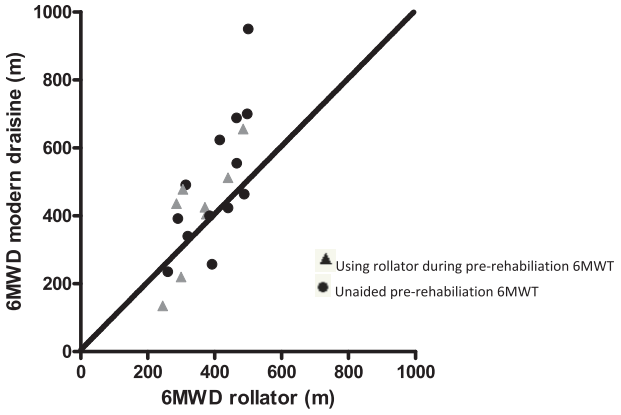

FIGURE 3. 6MWD in patients with COPD using rollator vs modern draisine. 6MWD = 6-min walk distance (in meters); 6MWT = 6-min walk test.

One of the main advantages of the modern draisine is the possibility of sitting on the seat, resulting in a lower load for the muscles of ambulation. This could explain at least partially why patients with COPD are able to walk further with the same metabolic demands. Furthermore, the modern draisine is foldable and lightweight (modern draisine, 9.0 kg, compared with the rollator, 12.4 kg), which makes it easy for everyday use. Similar to the rollator, the modern draisine has a basket, which gives patients with long-term oxygen therapy the ability to transport their oxygen. The major disadvantage of the modern draisine compared with a rollator is the higher cost, which is fivefold the cost of a rollator.

Table 3—*Metabolic Requirements During 6MWT (n = 10)*

Variables	Rollator	Modern Draisine	*P* Value
$\dot{V}O_2$ before, mL/min	304.7 (41.2)	314.5 (32.0)	.308
$\dot{V}O_2$ before, % $\dot{V}O_2$max	30.3 (9.0)	31.4 (9.7)	.241
$\dot{V}O_2$ at the end of 6MWT, mL/min	946.4 (159.5)	888.9 (173.8)	.600
$\dot{V}O_2$ at the end of 6MWT, % $\dot{V}O_2$max	93.6 (26.9)	90.8 (22.7)	.444
$\dot{V}O_2$ 2 min after, mL/min	437.7 (88.1)	458.1 (135.0)	.546
$\dot{V}O_2$ 2 min after, %$\dot{V}O_2$max	43.8 (16.0)	48.4 (19.5)	.302
$\dot{V}E$ before, L/min	14.8 (2.9)	14.2 (2.5)	.325
$\dot{V}E$ before, % $\dot{V}E$max	38.4 (14.9)	37.0 (13.9)	.311
$\dot{V}E$ at the end of 6MWT, L/min	34.8 (6.4)	35.3 (8.2)	.739
$\dot{V}E$ at the end of 6MWT, %$\dot{V}E$max	89.4 (24.1)	89.6 (22.8)	.951
$\dot{V}E$ 2 min after, L/min	20.3 (4.6)	21.0 (7.3)	.591
$\dot{V}E$ 2 min after, %$\dot{V}E$max	53.1 (21.9)	55.1 (26.6)	.521
HR before, bpm	84.6 (10.6)	85.7 (12.2)	.459
HR before, % HRmax	70.2 (12.2)	71.1 (12.6)	.472
HR at the end of 6MWT, bpm	107.5 (12.2)	110.4 (14.3)	.341
HR at the end of 6MWT, % HRmax	90.1 (10.8)	92.1 (12.2)	.290
HR 2 min after, bpm	90.1 (12.9)	97.8 (9.9)	.128
HR 2 min after, % HRmax	75.5 (12.8)	81.8 (11.2)	.109

Data are presented as mean (SD). 6MWT = 6-min walk test. See Table 1 legend for expansion of other abbreviations.

In the current study, patients with COPD had a higher velocity while walking with the modern draisine compared with walking with the rollator. Several studies have shown that the ratio between stride length and stride frequency is constant over a large range of walking speeds during normal walking in healthy subjects.[26,27] However, we found a significantly higher walk ratio in patients while using the modern draisine. This altered pattern indicates that patients with COPD using the modern draisine walked with a greater stride length relative to stride frequency, probably caused by the natural tendency to slightly roll between steps while using the modern draisine. Moreover, accelerations in the mediolateral direction were significantly lower when using the modern draisine compared with the rollator, which indicates a walking pattern with less lateral displacement. This is inconsistent with the findings of Menz and colleagues,[28] who reported previously that accelerations in the mediolateral direction appear to increase as walking speed increases. However, patients with COPD were able to sit on the seat of the modern draisine, probably resulting in a more fixed center of gravity and a reduced lateral displacement. Therefore, the "new" ambulation aid could result in a more effective walking pattern in patients with COPD, compared with walking with the rollator.

Hill et al[17] showed that the use of a rollator seems well tolerated in the everyday life of patients with COPD. Patients with COPD mostly use their rollator for outdoor activities, such as walking, shopping, or recreational pursuits.[17,25] Even though a rollator appears to be beneficial for patients with COPD, 48% of the patients with COPD using a rollator feel embarrassed about its use in daily life.[17] In our study, only 19% of the patients with COPD felt embarrassed using the rollator, because of "a visual indication of disability and aging," compared with only 10% with the modern draisine. Still, only 38% of the patients would use the new ambulation aid in their daily life. Whether patients' satisfaction with their walking aid may improve after they have used it for a longer period[29] remains unknown.

Several methodologic limitations need to be addressed. For obvious reasons, it was not possible to blind patients or the outcome assessor to the interventions. Furthermore, because of the portable metabolic system, we were not able to measure patients with long-term oxygen therapy. Therefore, data from oxygen uptake, ventilation, and heart rate during the 6MWTs were available in only 10 patients with COPD.

Table 4—*Data From Questionnaire*

Question	Rollator (n = 21)	Modern Draisine (n = 21)
Used before in daily life?	8	0[a]
Used before during 6MWT?	8	0[a]
Did you like the ambulation aid?	17	13
If not, why not?	Pain in arms (2)	Balance problems (4)
	Emotionally uncomfortable (1)	Problems with placing oxygen tank (1)
	Can easily do without (1)	Too heavy (1)
		Problems with seat (1)
		No reason (1)
Could you walk further with the ambulation aid compared with an unaided 6MWT?	20	13[a]
If you walk further, why?	Less dyspnea (6)	Less dyspnea (6)
	Safer (2)	More stable (2)
	More stable (7)	Less dyspnea and more stable (2)
	Less dyspnea and more stable (2)	Less exhausting (2)
	Less leg fatigue (1)	Faster (1)
	No reason (2)	
Were you ashamed using the ambulation aid?	4	2
If you were ashamed, why?	Too young (3)	Acceptance ambulation aid (1)
	Illness is visible (1)	Other aids are more convenient (1)
Would you use it in daily life?	16	8[a]
I felt safe while using the aid[b]	83.5 (21.8)	75.8 (19.6)
I felt like I could fall while using the aid[b]	13.1 (24.7)	36.6 (33.1)[a]
I felt stable while using the aid[b]	88.9 (18.2)	63.4 (27.9)[a]
I think this is a solid ambulation aid[b]	93.7 (8.7)	68.8 (32.8)[a]
I had confidence in the aid during the 6MWT[b]	89.6 (15.1)	73.4 (33.9)

Numbers indicate positive answers. See Table 3 legend for expansion of abbreviations.
[a]$P < .05$ vs rollator.
[b]Visual Analogue Scale score (mm).

Previously, unaided 6MWD cutoffs of 300 to 400 m have been suggested to identify patients with COPD who may benefit from a rollator.[8,10] Nevertheless, to the best of our knowledge, the current trial is the first to study the effects of the draisine in patients with COPD. Therefore, we decided to set a baseline 6MWD of 500 m as the upper limit for inclusion. In fact, seven of nine patients with a baseline 6MWD > 400 m walked further with the draisine compared with the rollator (Fig 3).

In this study, the 6MWTs were conducted indoors on a flat surface. Indeed, it can be questioned if the modern draisine can be used indoors. However, earlier studies have shown that a rollator is often used for outside activities.[17,25] Moreover, patients with COPD frequently reported outdoor walking as a problematic activity of daily life.[30] Therefore, future studies are needed to compare the effects of the modern draisine with those of the rollator during outdoor walking, using a self-paced walking test.[31] Because of the larger wheel size, the benefits of the modern draisine may emerge to be even better when used outdoors. This may also show that patients are able to walk at a similar speed but for a longer period while using a modern draisine.

The use of walking aids can result in clinically relevant increases in 6MWD in patients with COPD (Table 2), which may improve their everyday mobility. Then again, the observed increase in 6MWD due to the use of ambulation aids can only be considered an increase in functional exercise performance; it cannot be considered a real improvement in functional exercise capacity (eg, as seen after pulmonary rehabilitation).[32]

The proportion of patients with feelings of embarrassment about the use of ambulation aids was rather low (Table 4). This may be because the tests were performed in a clinical context. Numbers most probably increase when the tested walking aids are used in daily life.[17] The questionnaire used to assess patients' satisfaction was not validated. Future trials should consider use of the Quebec User Evaluation of Satisfaction with Assistive Technology.[33]

Finally, the current findings need to be interpreted in light of the number of comparisons that were made in the study. Nonetheless, multiple findings in the same direction, rather than a single statistically significant result, suggest that these are not due to chance alone. Moreover, "Bonferoni adjustments are at best, unnecessary and, at worst, deleterious to sound statistical inference."[34]

Because of the improvement in walking economy, the modern draisine may also be considered to facilitate early mobilization during and following exacerbation-related hospital admission. Indeed, a combination of early walking with ambulation aids and short-term exercise therapy has been shown to result in positive outcomes in patients with COPD and it may complement outcomes achieved through early pulmonary rehabilitation programs and reduce hospitalization.[35] This warrants further investigation.

Conclusions

In conclusion, the current study shows that the use of the modern draisine can improve functional exercise performance in patients with COPD. Therefore, this new ambulation aid may be a good alternative to the rollator in patients with COPD. Nevertheless, the choice of ambulation aid should be based on an exercise field test and the degree of acceptance by the patient with COPD.

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